

CLAIMS

1. A lithographic projection apparatus comprising:
 - a support structure configured to hold a patterning device, the patterning device configured to pattern a beam of radiation according to a desired pattern;
 - a substrate table configured to hold a substrate;
 - a projection system configured to project the patterned beam onto a target portion of the substrate;
 - a liquid supply system configured provide a liquid in a space between the final element of said projection system and said substrate; and
 - a measurement system configured to measure, not through said liquid, the location of a each of a plurality of points on said substrate.
2. An apparatus according to claim 1, wherein said substrate table comprises a reference and said measurement system is configured to measure, not through said liquid, the location of said reference.
3. An apparatus according to claim 2, wherein said measurement system is configured to measure and determine the location of each of a plurality of points on said substrate relative to said reference.
4. An apparatus according to claim 2, wherein said measurement system is configured to measure the location of said reference at an exposure position, where if said reference is not measured through said liquid a correction is applied.
5. An apparatus according to claim 1, wherein the measurement system comprises an alignment system configured to measure the location of each of a plurality of alignment marks on said substrate.
6. An apparatus according to claim 5, wherein said substrate table comprises a

reference and said measurement system is configured to measure, not through said liquid, the location of said reference.

7. An apparatus according to claim 6, wherein said measurement system is configured to measure and determine the location of each of a plurality of said alignment marks on said substrate relative to said reference.
8. An apparatus according to claim 6, wherein said alignment system is configured to measure the location of said reference at an exposure position, where if said reference is measured not through said liquid a correction is applied.
9. An apparatus according to claim 1, wherein said measurement system comprises a level sensor configured to measure the height and/or tilt of each of a plurality of points on said substrate.
10. An apparatus according to claim 9, wherein said level sensor is configured to measure said height and/or tilt by projecting a leveling beam onto the substrate and detecting said leveling beam as reflected by the substrate.
11. An apparatus according to claim 1, comprising an exposure station at which said substrate may be exposed and a separate measurement station, said measurement system being provided at said measurement station and said substrate table being movable between said exposure and measurement stations.
12. An apparatus according to claim 11, comprising a plurality of substrate tables, each movable between an exposure station and a measurement station.
13. An apparatus according claim 2, wherein said reference comprises a transmission image sensor.

14. An apparatus according to claim 1, wherein said measurement system is configured to generate a map of the substrate from the location of each of said plurality of points and comprising a controller configured to control the position of said substrate, using the map, during an exposure of said substrate through said liquid.

15. An apparatus according to claim 1, wherein said measurement system is configured to measure the location of each of said plurality of points on said substrate at an exposure position before said liquid is provided to said space, and comprising a controller configured to control the position of said substrate using the location of some or all of said plurality of points during an exposure of said substrate after said liquid is provided to said space.

16. An apparatus according to claim 15, wherein said measurement system comprises an off-axis alignment system to measure the location of each of said plurality of points.

17. An apparatus according to claim 15, wherein said measurement system comprises a level sensor configured to measure the location of each of said plurality of points by projecting a leveling beam onto the substrate and detecting said leveling beam as reflected by the substrate.

18. A device manufacturing method comprising:

- providing a liquid in a space between a final element of a projection system and a substrate;
- measuring the location of each of a plurality of points on a substrate using a measurement beam projected from a measurement system but not projected through said liquid; and
- projecting a patterned beam of radiation onto a target portion of the substrate using the projection system.

19. A method according to claim 18, comprising measuring, not through said liquid, the location of a reference on said substrate table.

20. A method according to claim 19, comprising measuring and determining the location of each of a plurality of said points on said substrate relative to said reference.
21. A method according to claim 19, comprising measuring the location of said reference at an exposure position, where if said reference is not measured through said liquid, applying a correction.
22. A method according to claim 18, wherein measuring the location of each of a plurality of points comprises measuring the location of each of a plurality of alignment marks on said substrate.
23. A method according to claim 22, comprising measuring, not through said liquid, the location of a reference on said substrate table.
24. A method according to claim 23, comprising measuring and determining the location of each of said plurality of alignment marks on said substrate relative to said reference.
25. A method according to claim 23, comprising measuring the location of said reference at an exposure position, where if said reference is measured not through said liquid, applying a correction.
26. A method according to claim 18, wherein measuring the location of each of a plurality of points comprises measuring the height and/or tilt of each of a plurality of points on said substrate.
27. A method according to claim 26, comprising measuring said height and/or tilt by projecting a leveling beam onto the substrate and detecting said leveling beam as reflected by the substrate.

28. A method according to claim 18, comprising an exposure station at which said substrate may be exposed and a separate measurement station, said measuring of the location of each of said plurality of points being performed at said measurement station and moving said substrate table between said exposure and measurement stations.

29. A method according to claim 28, comprising a plurality of substrate tables and moving each of said tables between an exposure station and a measurement station.

30. A method according to claim 18, comprising generating a map of the substrate from the location of each of said plurality of points and controlling the position of said substrate, using the map, during an exposure of said substrate through said liquid.

31. A method according to claim 18, comprising measuring the location of each of said plurality of points on said substrate at an exposure position before said liquid is provided to said space, and controlling the position of said substrate using the location of some or all of said plurality of points during an exposure of said substrate after said liquid is provided to said space.

32. A method according to claim 31, comprising measuring the location of each of said plurality of points using an off-axis alignment beam.

33. A method according to claim 31, comprising measuring the location of each of said plurality of points by projecting a leveling beam onto the substrate and detecting said leveling beam as reflected by the substrate.